

applying a high-energy vibrating force including one of an electromagnetic vibrating force and an ultrasonic vibrating force to the metallic material at temperatures lower than a melting point thereof during a solidification process of the molten metallic material to form cavities in the molten metallic material; and

crushing into small pieces, via impact pressure generated during collapse of the cavities, solid particles of the metallic material generated during the solidification process to yield a refined microstructure of the metallic material.

16. (New) The method of Claim 15, further comprising:

shifting the refined metallic material to a periphery of the metallic material via simultaneous imposition of an electric current and a magnetic field on the metallic material during the solidification process thereof.

17. (New) The method of Claim 15, wherein an electric current and a magnetic field are applied simultaneously to the metallic material.

18. (New) The method of Claim 15, wherein a high-energy vibrating force is applied to the metallic material at temperatures lower than a melting point thereof during last stages of the solidification process.

REMARKS

Favorable reconsideration of the present application in light of the above amendment and in light of the following discussion is respectfully requested.

Claims 15-18 are presently active in the case, with Claims 11-14 cancelled and with Claims 15-18, corresponding to subject matter from Claims 11-14, added, by way of the present amendment, without the introduction of new matter (see, e.g., original Claims 1-10 as filed, cancelled Claims 11-14 and Fig. 1 and the discussion in Applicants' disclosure thereof).